

Lyndon B. Johnson Space Center

roundup



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2007 year in review

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On the cover

Space Shuttle Discovery approaches the International Space Station during STS 120 rendezvous and docking operations. The Harmony node is visible in Discovery's cargo bay.

It's been almost 30 years since the day I arrived at Johnson Space Center, eager to begin my career as a newly named NASA astronaut. I remember the sense of awe and pride I felt as I realized the opportunity I had been given.

Today, my pride in America's space program and respect for the people who make it such a success are stronger than ever. The public sees the results of our hard work every time we launch or land a space shuttle and during challenging spacewalks to construct the International Space Station. That's a very small part of the picture. What I see on a daily basis is the unparalleled commitment of this workforce to push the boundaries of our knowledge as we explore the universe.

As we begin this new year, I encourage you to reflect on all this great team accomplished in 2007. This year, despite a three-month delay due to hail damage, we flew three of four scheduled shuttle missions, accomplishing most of the objectives planned in the original manifest. The effort of the full NASA team led us to the point where we were ready to fly four flights this year, when few people thought we could. The team was ready, and the station and shuttle crews were ready. In the end, the hardware was not, and we reaffirmed our commitment to flying only when we're ready to fly by delaying *Atlantis'* December mission into the new year. We sent Suni Williams, Clay Anderson, Peggy Whitson and Dan Tani to live and work aboard the station. And we made a little history with two female commanders in space simultaneously: Peggy commanding the space station and Pam Melroy commanding *Discovery*.

But the new year is also about looking toward the future. We have five shuttle missions on the books for this year, including a much-anticipated return to the Hubble Space Telescope. The space station will grow dramatically as we complete a significant portion of our international partner contributions with the addition of European, Japanese and Canadian components and an enhanced environmental system, setting the stage for a six-person crew capability.

The year 2008 will see us focused on our future in space. Constellation is moving forward aggressively with the development of the Orion spacecraft and the Ares launch vehicles. Next year we will see hardware being built and ground-based testing of launch pads taking place in Florida!

Men and women from all walks of life will visit JSC next year as we begin the selection process for the Astronaut Class of 2009. They will bring their hopes, dreams and experiences with them, much as the class of 1978 did so many years ago. But this class will train specifically for long-duration flights aboard station and possibly lunar missions as well.

My wish for the new year is for our continued shared success as we push the boundaries of exploration. JSC is blessed with strong community support and a workforce unlike any other I have seen. I look forward to working with all of you in the upcoming year.



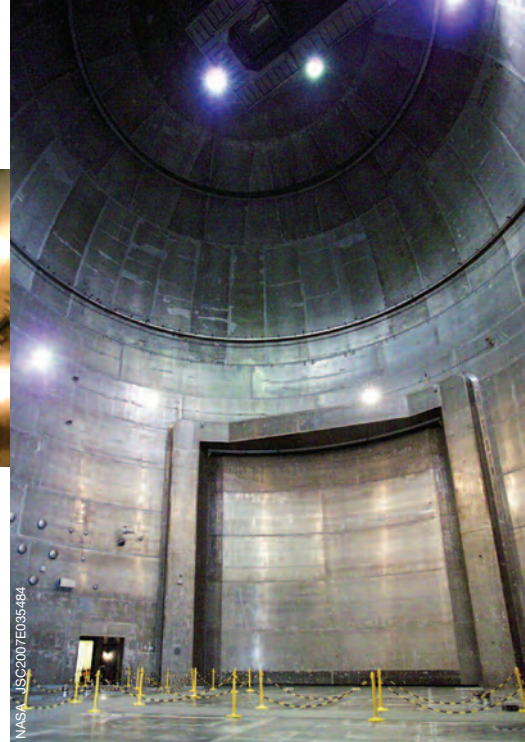
The Constellation Program is on track to meet the agency's objectives of flying a new spacecraft to the space station no later than 2015, and to the moon no later than 2020. In 2008, the program will transition into an exciting phase, with the focus shifting more toward hardware development and the real smoke and fire of testing.

Major Constellation Program highlights for 2007

- Signed a contract for the nerve system of the Ares I rocket. That puts all components of the crew launch stack under contract, including the Orion spacecraft, Ares I first stage and upper stage and the J-2X engine and instrumentation unit.
- Completed a full review of the launch stack, making sure that all of the pieces are well-integrated to accomplish their mission objectives.
- Completed a bottoms-up review of the Orion spacecraft concept and got the "go" from NASA Administrator Mike Griffin to proceed with the preliminary design process.
- The government and Lockheed Martin team took a detailed look at all of Orion's systems to ensure a fully functional and safe spacecraft that meets all of the weight (mass), size (volume) and electrical power needs within budget.
- Received go-ahead to proceed with the preliminary design review for the Ares I rocket.
- Dedicated several key facilities: White Sands Missile Range test pad in New Mexico, Plum Brook spacecraft testing facility in Ohio, A-1 engine test stand in Mississippi and the operations and checkout spacecraft assembly facility in Florida.
- Began construction of a Lightning Protection System around launch pad 39-B at Kennedy Space Center.
- Accomplished testing and test preparations for:
 - Parachute tests for both Orion and Ares I
 - Construction of command module simulator for first launch abort system test
 - J-2X engine power packs
 - Subscale reverse-flow solid rocket for launch abort system
- The Exploration Systems Mission Directorate Lunar Architecture Team passed the baton so that Constellation can incorporate its work in establishing lunar surface concepts into the framework of the overall program.



A miniature reverse-flow solid rocket engine destined for use in the Orion spacecraft's launch abort system is test fired. The first pad abort test that will use a full-scale engine is set for September 2008 at the U.S. Army's White Sands Missile Range in New Mexico.



Workers at NASA's Glenn Research Center have begun demolition work at the Space Propulsion Facility near Plum Brook, Ohio, that will shake, bake, freeze and blast the Orion spacecraft with sound waves to test its ability to stand up to the rigors of spaceflight.



The Constellation Program continues work on the development of the Orion spacecraft that will return humans to the moon and prepare for future voyages to Mars and other destinations in our solar system. This artist's rendering represents a concept of an abort flight test of the Launch Abort System.



Lucien Junkin, a robotics engineer, gets ready to take NASA's new lunar truck prototype for a spin at Johnson Space Center.

constellation

The next chapter in our safety and security

Only a few months ago, Johnson Space Center started its campaign to inform JSC team members about the upcoming new security features that will be implemented with Homeland Security Presidential Directive 12 (HSPD-12). Now that vision for increased security is becoming a reality, with waves of change moving across the center.

"NASA has exceeded the 95 percent mark for initiating background investigations on applicable civil servant and contract employees. We have also enrolled more than half of our employees in the new badging system," said Walter Hussey, NASA HSPD-12 Program director. "The JSC Security Office will continue to enroll the workforce in preparation for issuance of a new badge. The actual process of providing NASA employees with the new NASA badge will be accomplished in the coming months, once technical issues are resolved. JSC will continue to use the current NASA badges until the new badging process is complete."

HSPD-12 mandates that all government agencies must implement security controls and measures under the direction of the National Institute of Standards and Technology. Issued Aug. 27, 2004, HSPD-12 was hailed as the answer to audits showing that the government lacked adequate network security for Information Technology (IT) operations. In addition to stringent IT security, physical security elements at the center will be vastly improved.

"In order for JSC to become compliant with HSPD-12, there are several steps that need to be completed. The most immediate step is completing background investigations on all individuals, civil servants, contractors, foreign nationals, etc., that access the JSC facility for more than 180 days or access NASA's IT systems and information," said Lynn Vernon, chief of the Information and Applications Systems Division and JSC HSPD-12 Implementation manager.

The advent of the smartcard, a badge equipped with a computer chip to store information, will add a new layer of security that did not previously exist. Before, you only needed a log-in ID and password to access a computer system.



NASA/BLAIR JSC2007ET1404

JSC Security Officer Johannes Ragin checks the badge of an employee coming on site.

But you won't notice changes just at your computer workstations.

"Access to most controlled access areas, such as the Mission Control Center, simulators, etc., will soon require a user PIN in addition to the badge proximity reader," said Tom Miglin, JSC and White Sands Test Facility HSPD-12 Implementation deputy manager.

No one at JSC will be immune to the changing security climate.

"All systems, applications, facilities and users will be impacted by HSPD-12," Vernon said. "This is a complete change in our physical and IT security processes and procedures, which will result in a cultural (shift)."

Although an implementation plan of this scale carries some risk for possible complications migrating to the new system, the future rewards will outweigh the immediate headaches.

"Each phase of the implementation carries a risk to operations. We are working to continually minimize this risk by providing consistent and better communications to all of the affected community," Vernon said.

Communications process improvements

As a result of the tragic workplace incident on April 20, JSC Director Mike Coats solicited feedback from the NASA community on ways to improve communications throughout the center in the event of an emergency or crisis. These suggestions were compiled from e-mails and town hall meetings with all JSC team members and management officials. The results of the findings were compiled into a Building 44 Incident Report and Corrective Action/Process Improvement Plan. Most of these improvements have been implemented, and the remainder should be implemented this year. Below are a few of the major improvements that were put in place.

- Created the JSC Emergency Awareness (JEA) Web site, which includes up-to-date information straight from the Emergency Operations Center (EOC). Other features include emergency blogs, or channels, such as “Daily Emergency Events,” which contains information on current emergencies phoned into the EOC. There is also a “Hurricane Season” blog, which has information specific to what JSC is doing concerning hurricane threats. As an added feature, the JEA blogs contain RSS feeds. You can have updates automatically sent to your RSS feed reader. The JEA Web site is linked from the JSC Home page, or it can be found at <http://jea.jsc.nasa.gov/>.
- Implemented capability for Emergency Notifications to be broadcast as a banner on NASA TV Channel 3 and all TV channels broadcast at JSC.
- Developed an internal communications protocol to notify employees of threatening situations as quickly and accurately as possible.
- Created the Resolving Issues Web site, which documents what to do if an employee has an issue that needs to be brought forth to management, and the various channels one can use to get assistance for different types of conflict in the workplace. The Resolving Issues Web site can be found at <http://resolvingissues.jsc.nasa.gov/>.
- Included critical situation overview/response/terminology into the Annual JSC Security Refresher Training for all JSC team members.



IN MEMORY OF W. DAVID BEVERLY 1944 2007

*On April 20,
Johnson Space Center
tragically lost one
of its family members,
David Beverly.
He was a well respected,
highly regarded
NASA engineer who
supported the space program
for over 25 years.
David had many friends
and coworkers
across the agency.
His memorial, held
in JSC's Teague Auditorium,
was April 25.*



Visitors and media gathered to witness the reopening of the restored Saturn V rocket and its new home.

Grand opening for Saturn V rocket

Johnson Space Center hosted the grand opening of a restored Houston landmark and national treasure, the immense Saturn V rocket, on July 20, 38 years to the day after humans first walked on the moon.

The 30-story-tall rocket, which rests at the JSC front gate, is part of the Smithsonian National Air and Space Museum collection and one of only three such rockets in existence. Speakers at the ribbon-cutting ceremony included astronauts and moonwalkers John Young and Alan Bean, as well as astronauts Walt Cunningham, who flew on the Apollo 7 flight in Earth orbit, and Joe Kerwin, who flew in an Apollo spacecraft to the Skylab space station.

Apollo-era flight director Chris Kraft, curator of the Apollo collection at the National Air and Space Museum Allan Needell and JSC Director Mike Coats also participated.

Kraft said the anniversary brings back a number of memories.

"Each time this date rolls around, the landing of men on the moon seems to become more surreal," Kraft said. "At the time, it seemed the start of a fantastic voyage to the stars."

The Saturn V is one of the largest and most significant artifacts in the Smithsonian's National Air and Space Museum collection. It has been on loan to JSC since 1977. The rocket is made up of parts from launch vehicles originally designated for Apollo 18 and 20.

Panels depicting the Apollo era line the facility housing the famous national treasure.

The Saturn V remains the most powerful rocket ever built. It was launched 13 times from 1967 to 1973, carrying 27 Apollo astronauts into space. Nine of the missions it launched traveled to the moon, and six landed there. The final Saturn V launch in 1973 put Skylab, America's first space station, in orbit.

"I have to say there was genius behind the design of this thing," Bean said. "Behind the hardware were thousands of men and women that were able to imagine this vehicle to begin with, and they were able to design and manufacture it."

The Saturn V at JSC was exposed to the elements for more than 20 years while on display. The exposure caused extensive corrosion and degradation.

"It was in poor condition and it was getting much worse," Needell said. "It was to the point where if we didn't intervene now, future attempts to save it would require replacing a lot of the original materials. We wanted to save as much of the original material as possible."

To save the Saturn V, the National Air and Space Museum applied for a grant in 1999 to preserve the rocket through the Save America's Treasures Program, the centerpiece of the White House National Millennium Commemoration. For the preservation, the museum received funds from Boeing, Lockheed Martin, Houston Endowment, Halliburton and other sources. Matching funds were provided by the National Park Service.

The restoration ensures the Saturn V will remain on exhibit to inform and inspire many generations of visitors to come. The preservation work was performed by Conservation Solutions, Inc. of Washington, D.C.

The facility is now open daily from 9 a.m. to 6 p.m.



NASA/BLAIR JSC2007E037892

NASA/BLAIR JSC2007E037893



Happy birthday, NBL!

The best kind of party to celebrate the Neutral Buoyancy Laboratory's (NBL's) 10 years of operation would have to be one that the lab specializes in—a pool party! The first NBL run, or training exercise, was completed Jan. 7, 1997. Its official dedication was June of that year. Since then, the specialized underwater training facility and lab has enjoyed an illustrious, albeit somewhat short, history.

“When you look at the history of neutral buoyancy training, from Gemini to station, you can really see the tremendous importance this type of training facility has to the agency. International Space Station assembly would have been nearly impossible without the use of neutral buoyancy training,” said Chris Borne, NBL deputy operations manager for Oceaneering Space Systems. “You just can’t get this type of training in any other environment on the planet. The exact ‘where’ and ‘how’ we fall in for future programs is still to be determined, but I can’t imagine starting that journey without including the NBL in the mix.”

The massive pool is not for the faint of heart. The NBL was sized to perform two activities simultaneously. It is 202 feet in length, 102 feet in width and 40 feet in depth. The behemoth human aquarium holds 6.2 million gallons of water. Even at this size, the International Space Station, at 350 feet by 240 feet when complete, will not fit inside the NBL.

“Simply put, the NBL is my hands-down favorite place in all of Johnson Space Center. It’s here that you really immerse yourself, literally and figuratively, into the space environment while still tethered to Earth,” said astronaut Scott Parazynski, who has trained the most hours in the facility. “As soon as my visor drops below the surface of the water, for all intents and purposes I’m floating outside the station: the fidelity of the mockups is near perfect, down to the labels on the handrails and the physical clocking of the countless connectors. When you’re actually outside doing a real EVA, it feels like you’ve



NBL workers share in the celebration of their one-of-a-kind training facility's 10th birthday.

NASA/SOWA JSC2007E041582

been there a million times before. It’s only when you glance up and see the Aurora Borealis or the Himalayas that you realize you’re no longer in the NBL!”

A facility of this magnitude takes extensive coordination to run smoothly.

“EVA training at the NBL is extremely complex. There are over 200 people working in the facility. In addition to the people that work at the NBL, we interface extensively with our users in the Mission Operations Directorate, the Astronaut Office and others to meet their needs and ensure that training and testing is as safe and accurate as possible,” said Ronald Lee, chief of the NBL. “We are also extremely safety conscious, since our daily operations are inherently risky. Having a good working relationship with the safety community is vital. The NBL is one of the more hazardous facilities we operate at JSC, and the NBL team’s dedication to safety and our mission makes it a world-class facility.”

Its record speaks for itself. In the past three years, the NBL has not had a lost workday injury in over 75,000 hours of diving operations.

NBL team members know that they are doing great work for NASA’s space program every time they hear that their efforts made the “real deal” a seamless transition.

As Lee said, “It is great to hear the astronauts tell us, after their mission, that their spacewalk was just like being in the NBL...but without the bubbles.”

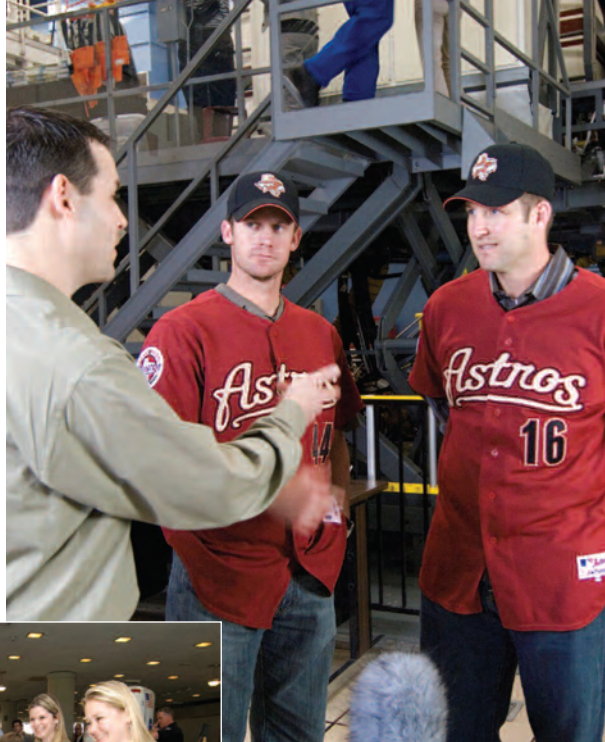
Outreach

Johnson Space Center was very active in its own neighborhood of “Space City” by being involved within the community and showing a NASA presence at a variety of sporting events, special events and other outreach opportunities. But JSC didn’t stop there—efforts were made to reach throughout the nation and spread the story of this great space program, and to show the generous spirit of our team members in action.

Sporting Events *(approximately 2.8 million people reached)*

The JSC team was heavily involved with sports-related activities in 2007, with visits to the center from the Houston Astros, Rockets and Comets. JSC also got involved in football when Nebraska native astronaut Clay Anderson greeted University of Nebraska fans with a message from the International Space Station. JSC continued to broaden its horizons in the sports arena with other unique opportunities:

- JSC developed a nationwide Grand Prix racing campaign that extended NASA’s message to racing fans through partnerships with other NASA centers. During the campaign, JSC reached events in Houston, Cleveland, San Jose and Wisconsin with the cooperation of Ames Research Center, Glenn Research Center and various volunteers. At all of the Grand Prix events, NASA’s exhibit displayed an actual shuttle tire, a spacesuit display for photo opportunities and information on how NASA spinoffs have helped the automotive industry.
- The JSC family was invited to Minute Maid Park on July 24 to see the Houston Astros take on the Los Angeles Dodgers. Highlighting the event was the ceremonial first pitch thrown out by the STS-120 crew. Fans received baseball hats with the STS-120 crew patch.



Houston Astros players Roy Oswalt (left) and Jason Lane visited Johnson Space Center for a tour of the facilities and to meet with fans.

JSC team members had the special opportunity to mingle with Houston Astros players and get autographs signed in the café.



JSC reached out to Grand Prix racing fans with interactive exhibits throughout the country.



The JSC exhibit has been a fixture at Rodeo Houston every year.

- JSC was honored at a NASA Night with the Houston Rockets on Feb. 5. The previous year, Houston Rockets star Tracy McGrady had received the unique chance to check out the kind of training astronauts go through to prepare for flight alongside avid sports fan and astronaut Bob Curbeam. At the special courtside ceremony this year, McGrady's jersey—which had been flown in space with the STS-116 crew—was returned to him.
- JSC featured exhibits at the Austin, Boston and Dallas Marathons this year, educating visitors on how astronauts live and exercise in space, as well as offering information about the future of space exploration. Astronaut Sunita Williams reached out to the running community when she took part in the Boston Marathon while aboard the station, orbiting over 200 miles above the other runners.

Special Events (approximately 2.4 million people reached)

JSC participated in several local special events this year, including Rodeo Houston, India Fest, Wings Over Houston and the Ballunar Liftoff Festival. For each event, JSC provided exhibits that allowed employee volunteers to interact with visitors and share NASA's mission while astronauts signed autographs.

JSC also had a national presence, supporting events such as the Albuquerque International Balloon Fiesta in October. In a joint effort with Goddard Space Flight Center, NASA provided an exhibit showcasing the Robonaut and other special items, such as a photo booth, shuttle orbiter model, an inflatable Crew Exploration Vehicle and more. Over a million visitors stopped by the NASA exhibit to learn about what's in store for the future of space exploration.



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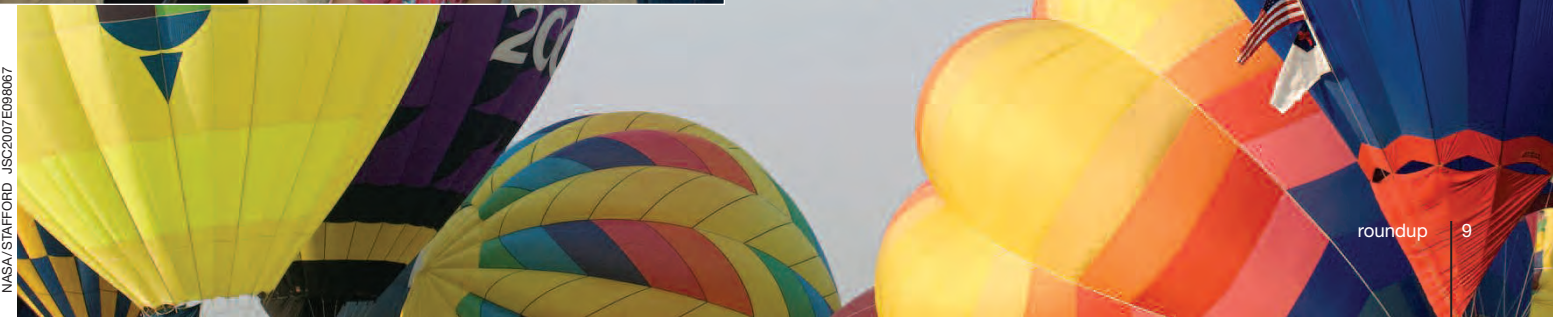
Johnson Space Center gets into the spirit of the rodeo as one of the many hitching posts for the annual trail ride.



NASA/HARNETT JSC2007E051306

Aviation enthusiasts taking in Wings Over Houston at Ellington Field participate in activities at the NASA exhibit.

The Ballunar Liftoff Festival decorated the skies of JSC with spectacular, high-flying balloons.



NASA/STAFFORD JSC2007E098067



NASA is laying the groundwork for flying its next-generation spacecraft and tackling future missions to the International Space Station, the moon and possibly other destinations. In addition to building new vehicles, NASA is preparing for the transformation of its infrastructure and workforce that must take place before the next chapter in human spaceflight begins under the guidance of the Constellation Program.

To meet the challenges of the Transition, NASA has people in place to develop plans for transforming NASA's human spaceflight efforts from mainly operational and ground-processing work to an endeavor that is more focused on design and development.

During a forum on Nov. 27, Johnson Space Center Director Mike Coats and other Transition leaders provided an update to JSC team members about Transition efforts and the challenges ahead.

"The big picture is actually pretty good because the budget is essentially constant," Coats said. "That means the workforce is essentially constant. The challenge we have is skills matching."

The JSC Transition Integration Panel (JTIP) is a forum that includes representatives from the Shuttle, International Space Station and Constellation Programs, as well as from other JSC organizations. JTIP was established to carry out Transition activities, which include the planning, coordination and integration of efforts among JSC institutional organizations and resident programs.

Coats said he knows JSC will handle the challenge.

Exploration Systems Mission Directorate Transition Manager John Olson said the Transition is about more than just change at JSC. "This is an agency challenge," Olson said. "NASA Transition is all about our people, our processes and our property."

The Constellation Program will be responsible for new spacecraft—the Orion Crew Exploration Vehicle—and the Ares I and Ares V rockets. NASA must shift much of its human spaceflight resources to support Constellation.

In the meantime, NASA continues to launch space shuttle missions and build the space station. The shuttle fleet is scheduled to be retired Sept. 30, 2010.

"We are making huge progress in defining what exactly the Constellation Program needs and will need in that time frame," Coats said.

Even though NASA has people assigned to work on the Transition process, the responsibility is not limited to those team members. "I have been asked who is responsible for Transition," Coats said, "and the answer is: all of us."

Coats said JTIP will provide information to the workforce. "I want to make the point that a lot of folks are working this," Coats said, "and we are trying very hard to communicate what is being done."

Coats encouraged JSC team members to visit the Transition Web site at <http://transition.jsc.nasa.gov/> for the latest information.

While the implementation of Transition efforts is still in the works, Olson said the destination is clear. "From an exploration perspective, it is truly an exciting time. We have a clear vector on where we are going."



JSC team members attended a Transition forum on Nov. 27.



Not your usual business suit. Astronaut Rex Walheim, STS-122 mission specialist, dons a training version of the Extravehicular Mobility Unit spacesuit in preparation for a training session in the waters of the Neutral Buoyancy Laboratory.

"Carpooling" takes on a whole new meaning when you're an astronaut on your way to work. Backdropped by rugged Earth terrain, the Space Shuttle Atlantis approaches the International Space Station during STS-117 rendezvous and docking operations.

NASA is looking for candidates for its 20th astronaut class. In the past 48 years, NASA has hired 321 astronauts, but this group will have the distinction of being the first class since 1978 to be selected for something other than a shuttle flight. Because this selection period won't end until 2009, and because it takes about two years of training to become an astronaut, this new class won't be ready to fly until 2011—a year after the Space Shuttle Program is scheduled to be retired.

Still, the astronaut program thinks it can make applicants an appealing offer: the chance to spend three to six months orbiting the Earth from 200 miles up in the International Space Station.

"Can you imagine being in space for 90 days or six months? It's awesome," said Duane Ross, astronaut candidate selection and training manager.

Awesome pretty much describes most of the astronaut experience, according to those who have been there and done that. The training is difficult, they say, and the hours sometimes long. But the payoff is worth it, if a little on the surreal side.

"We're up there, using the space station to figure out how to go to other places in the universe," said Sunita Williams, Expedition 14 and 15 flight engineer. "How to work in a low-gravity environment and how to work in an environment that is not habitable for us—that will take us to the next place."

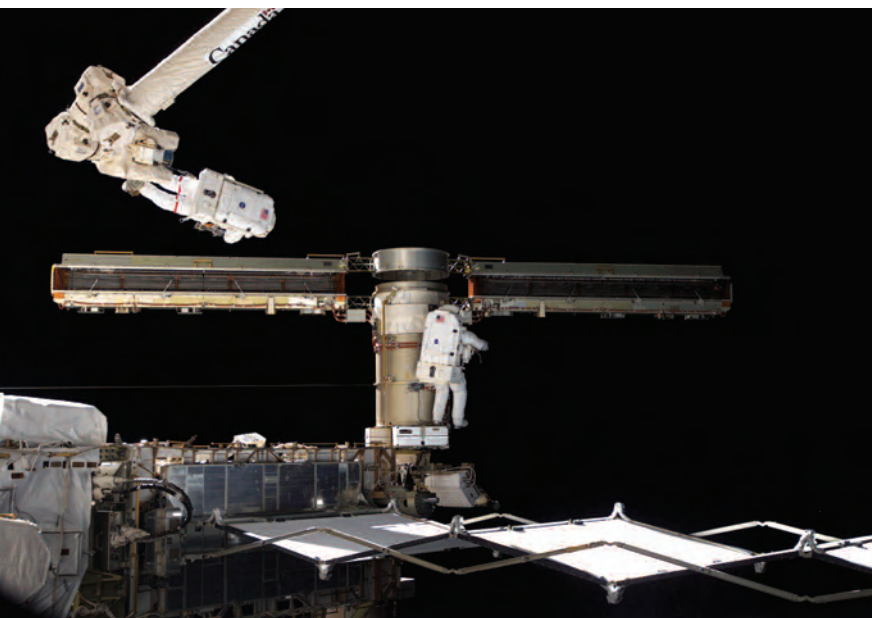


Speaking of the next place, astronauts selected for the class of 2009 will be right in the middle of preparations for NASA's next big adventure.

"What we're doing right now is planning for Constellation, Orion, Ares—going back to the moon," Ross said. "I was here when we went to the moon the last time, and that's really exciting stuff. The class we select will be here during all that preparation time, all the planning. There will be some really interesting things for them to do and be involved in."

Applications are due by July 1, and must be submitted at www.usajobs.gov. More information on qualifications and job responsibilities can be found at www.nasa.gov/astronauts/recruit.html.

Help Wanted:
Seeking intelligent, capable engineers, scientists, educators and pilots willing to sleep in their office in exchange for a great view.



Astronauts Jim Reilly (on robot arm) and John “Danny” Olivas complete the delicate process of folding an older solar array so that it can be moved from its temporary location to its permanent home during a later shuttle flight. This was part of the seven-hour, 58-minute spacewalk by the two mission specialists, who successfully worked through a very busy agenda.

NASA S117E07625

STS-117 Launched: June 8

STS-117’s 14-day mission successfully increased the power capability of the International Space Station, preparing for the future delivery of European and Japanese laboratories.

Atlantis’ Commander Rick Sturckow, Pilot Lee Archambault and Mission Specialists Jim Reilly, Patrick Forrester, Steven Swanson, John “Danny” Olivas and Sunita Williams landed at Edwards Air Force Base, Calif., at 2:49 p.m. CDT on June 22.

Expedition 15 Flight Engineer Sunita L. Williams returned to Earth from the space station aboard STS-117. That flight carried Expedition 15/16 Flight Engineer Clayton Anderson to the station.

The crew attached the new S3/S4 solar array truss segment on the right side of the station’s backbone, deployed a new set of solar arrays and retracted the Port 6 starboard solar array back into its box. The station has a new look with two symmetrical solar panels mounted on each end of the station’s truss.

Reilly, Olivas, Swanson and Forrester, with the help of crewmates, made four spacewalks to complete the construction tasks. They activated the truss segment and the Solar Alpha Rotary Joint, which allows the new arrays to track the sun, and helped fold the Port 6 array. During the third spacewalk, the crew repaired a four-by-six-inch raised corner of a thermal blanket on the port side Orbital Maneuvering System pod. Aerodynamic forces during *Atlantis’* ascent lifted the blanket.

Ground teams troubleshooted a problem with the Russian computers that help control the station’s attitude. Russian specialists worked closely with teams in the United States to recover the computer capabilities.

STS-118 Launched: Aug. 8

STS-118’s 13-day mission added another truss segment, a new gyroscope and an external spare parts platform to the International Space Station.

Endeavour’s Commander Scott Kelly, Pilot Charlie Hobaugh and Mission Specialists Tracy Caldwell, Rick Mastracchio, Barbara R. Morgan, Alvin Drew and Canadian Space Agency astronaut Dave Williams landed at Kennedy Space Center in Florida at 11:32 a.m. CDT on Aug. 21.

Astronauts Rick Mastracchio and Canadian Space Agency’s Dave Williams (out of frame), both STS-118 mission specialists, participate in the mission’s first spacewalk as construction continues on the International Space Station. During the six-hour, 17-minute spacewalk, Mastracchio and Williams attached the S5 segment of the station’s truss, retracted the forward heat-rejecting radiator from the station’s P6 truss and performed several get-ahead tasks.



NASA S118E06135



Backdropped by a blue-and-white Earth, the Space Shuttle Endeavour is shown docked to the Destiny laboratory of the International Space Station. The shuttle's Canadian-built Remote Manipulator System robotic arm and the station's Canadarm2 are also featured. The SPACEHAB pressurized logistics module is visible in Endeavour's payload bay.

Williams, Mastracchio and station Flight Engineer Clayton Anderson, with the help of their crewmates, made four spacewalks to accomplish the construction tasks. The spacewalkers also completed work in preparation for upcoming assembly missions, such as relocating an equipment cart and installing support equipment and communication upgrades.

During the mission, a new system that enables docked shuttles to draw electrical power from the station to extend visits to the outpost was activated successfully. Because the system worked, two additional days were added to *Endeavour's* mission.

STS-120 **Launched: Oct. 23**

STS-120's 15-day mission added a key component to the International Space Station and featured an unprecedented spacewalk to repair a damaged solar array.

"This mission demonstrates the value of having humans in space and our ingenuity in solving problems," said Bill Gerstenmaier, associate administrator for Space Operations, NASA Headquarters. "The teams on the ground worked around the clock, along with the crews in space, to develop a plan to fix the array. Our high level of preparedness gave us the edge necessary to make this a successful mission."

Discovery's crew of Commander Pam Melroy, Pilot George Zamka and Mission Specialists Scott Parazynski, Doug Wheelock, Stephanie Wilson, Clayton Anderson and European Space Agency astronaut Paolo Nespoli delivered the Node 2 module, known as Harmony. Harmony will provide attachment points for European and Japanese laboratories to be added in 2008.

In addition to Harmony's installation, *Discovery's* crew performed three spacewalks and relocated the P6 truss and solar arrays to their permanent position on the left side of the station. During the fourth spacewalk, the crew

repaired a torn solar array on the truss, enabling the full deployment of the array.

The crew and ground teams also worked on a problem with one of the station's Solar Alpha Rotary Joints, which allows the right-side arrays to track the sun. On the second spacewalk, the joint was inspected and metal shavings were discovered. Samples of the shavings returned with *Discovery* for further analysis. In the meantime, use of the joint will be limited to occasional adjustments for optimal position in relation to the sun.

Expedition 15/16 Flight Engineer Clayton Anderson returned to Earth from the space station aboard STS-120. That flight carried his replacement, Expedition 16 Flight Engineer Daniel Tani, to the station. Tani will return home on STS-122.

Discovery landed at Kennedy Space Center in Florida at 12:01 p.m. CST on Nov. 7.

Expedition 14

Commander Michael Lopez-Alegria and Cosmonaut Mikhail Tyurin of the 14th International Space Station crew docked to the station at 12:21 a.m. CDT on Sept. 20, 2006, to begin their six-month stay in the orbiting laboratory.

With Tyurin at the controls, the Soyuz TMA-9 spacecraft docked smoothly at the aft port of the Zvezda service module. With them was American Anousheh Ansari, who was flying under contract with the Russian Federal Space Agency. She was the first female spaceflight participant to visit the station.

The new crew members were greeted by the Expedition 13 crew, Commander Pavel Vinogradov and NASA Science Officer Jeff Williams, as well as a third Expedition 14 crew member, European Space Agency astronaut Thomas Reiter of Germany. Reiter arrived at the station aboard *Discovery* on the STS-121 mission.

An out-of-this-world golf shot was part of the mission following a five-hour, 38-minute spacewalk. Lopez-Alegria and Tyurin performed the spacewalk from the Pirs Docking Compartment airlock on Nov. 23, 2006, and finished up with a golf shot that merited a high-flying birdie rating. The golf shot was sponsored by a Canadian golf company through a contract with the Russian Federal Space Agency.



NASA ISS015E2323

Expedition 15

Launching on April 7 from the Baikonur Cosmodrome in Kazakhstan aboard their Soyuz TMA-10 spacecraft, Expedition 15 crew members, cosmonauts Fyodor Yurchikhin and Oleg Kotov, began their nearly six-month stay orbiting the planet.

There to welcome them to their new home among the stars was the crew of Expedition 14, Michael Lopez-Alegria and Mikhail Tyurin, as well as Flight Engineer Sunita Williams.

While on orbit, Williams set new records for the longest-duration spaceflight by a woman and for clocking the most number of hours during a spacewalk by a female astronaut. (However, her spacewalk record was later broken by Peggy Whitson on Expedition 16.) In April, Williams laced up her running shoes and participated in the Boston Marathon, running on a treadmill nearly 200 miles above the runners on the ground. Williams' high-flying experiences came to an end when she returned to Earth aboard *Atlantis* on the STS-117.

Flight Engineer Clayton Anderson replaced Williams as a member of the expedition after catching a ride up on the same mission that later brought Williams home.

Expedition 16

The Expedition 16 crew of Commander Peggy Whitson and Flight Engineer Yuri Malenchenko blasted off from the Baikonur Cosmodrome in Kazakhstan at sunset on Oct. 10 in a Soyuz TMA-11 spacecraft. With this launch, Whitson became the first female commander of an expedition crew.

While docked with the International Space Station during STS-118, Space Shuttle Endeavour's orbital maneuvering system pods and vertical stabilizer are highlighted in this image.

Discovery's STS-120 mission brought up to the station Expedition 16 Flight Engineer Daniel Tani, who replaced Flight Engineer Clayton Anderson.

STS-120 Commander Pam Melroy and Expedition 16 Commander Peggy Whitson made history on Oct. 25 when the hatch between the space shuttle and orbiting outpost was opened. They became the first female spacecraft commanders to lead space shuttle and space station missions concurrently.

Whitson also made the record books again, inching out Expedition 15 Flight Engineer Sunita Williams' record by clocking the most cumulative spacewalk time by a woman.

Flight Engineer Léopold Eyharts, a European Space Agency astronaut from France, will join Expedition 16 as a flight engineer after launching to the station aboard Space Shuttle *Atlantis* on STS-122.

The Canadarm2 (center) and solar array panel wings on the International Space Station are visible during the mission's first spacewalk while Space Shuttle Endeavour was docked with the station during STS-118.



NASA ISS015E21945

NASA Johnson Space Center Economic Impact in Texas Fiscal Year 2007

While Johnson Space Center has earned a global reputation for achievements in space exploration, less evident are the economic benefits the institution brings locally and to the State of Texas. JSC's role is a vital part of the regional and state economies. Here are some highlights:

PROGRAM	OBLIGATIONS (\$B)	OBLIGATIONS %
Space Shuttle	2.1	44%
International Space Station	1.2	26%
Exploration	0.8	17%
Institutional Overhead	0.4	8%
Other	0.3	5%
Total	4.8	100%

In Fiscal Year 2007 (FY07), JSC obligated a total of \$4.8 billion, or about one third of the agency total.

About \$4.1 billion of the total obligation (\$4.8 billion) was for contracts and grants. 94 large businesses performed portions of the contracts totaling slightly more than \$2.7 billion in Texas.

\$123 million went to 129 small businesses working in Texas.

JSC obligated almost \$30 million on grants, contracts and agreements with Texas universities and education institutions in FY07.

JSC did over \$41 million in business with women owned businesses in Texas.

Nearly \$49 million was spent on contracts performed in Texas by veteran owned businesses.

Nearly \$31 million of JSC funding in FY07 was obligated on grants, contracts and agreements with nonprofit organizations.

Johnson Space Center Economic Impact of Civil Service Workforce in FY07

COMMUNITIES	TOTAL NUMBER OF EMPLOYEES	ESTIMATED INCOME OF EMPLOYEES (Dollars in Millions)
Webster	76	7.2
League City	586	59.5
Seabrook/El Lago/Taylor Lake	266	28.8
Kemah/Bacliff	42	4.2
Clear Lake Area (including Nassau Bay)	1,014	111.4
Friendswood	367	41.4
Dickinson	66	5.8
Alvin	46	4.5
Pearland	155	15.9
La Porte/Shoreacres/Baytown	42	3.6
Pasadena/Deer Park	50	4.3
Other Houston Areas	313	28.7
Other Galveston County Areas	61	5.8
Other Areas of Texas	133	12.1
Out of State*	207	14.8
Total	3,424	348

Note: The number of civil servants is a headcount value as of Nov. 30, 2007, and the salary shown reflects the adjusted basic pay within the Federal Personnel and Payroll System database for calendar year 2007. The adjusted basic pay is defined as an employee's basic pay plus the locality differential. Income numbers are rounded.

* The Out of State value includes White Sands Test Facility.

Backdropped by the blackness of space, the International Space Station appears to be very small as the Space Shuttle Endeavour departs from it.

statistics



A new dawn *If the landscape at the Johnson Space Center Child Care Center seems a little “alien” these days, it’s for a good—and beneficial—reason. Construction to add solar arrays, or Photo Voltaic panels, wind turbines and a solar water heater to the child care center concluded at the end of September. Not only did these modifications alter the landscape with some can’t-miss additions, but the greening project is also ushering JSC into a new dawn of environment preservation and energy conservation.*

“Within Center Operations, we are always looking at energy conservation projects, or items to obviously reduce energy consumption at JSC and also meet federal government mandates to reduce the energy usage that we have here,” said Melissa McKinley, who manages the utilities branch within Center Operations. “In addition to that is the new initiative toward Leadership in Energy and Environmental Design construction in both new construction and existing buildings, so we’re looking at ways to do that in many facilities.”

Sustainability and renewable energy are integral parts of keeping our own blue marble healthy for years to come. JSC, as well as all NASA sites, are looking to implement more cutting-edge ideas similar to what the child care center has now.

Space Center Roundup

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